

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/667,160	LIM ET AL.	
	Examiner JAMES C. KERVEROS	Art Unit 2138	

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--*

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS. This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to 9/17/2003.
2.  The allowed claim(s) is/are 1-20.
3.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a)  All    b)  Some\*    c)  None    of the:
    1.  Certified copies of the priority documents have been received.
    2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4.  A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a)  including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1)  hereto or 2)  to Paper No./Mail Date \_\_\_\_\_.
  - (b)  including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

#### Attachment(s)

1.  Notice of References Cited (PTO-892)
2.  Notice of Draftsperson's Patent Drawing Review (PTO-948)
3.  Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date 5/04, 1/05
4.  Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5.  Notice of Informal Patent Application (PTO-152)
6.  Interview Summary (PTO-413),  
Paper No./Mail Date 20060130.
7.  Examiner's Amendment/Comment
8.  Examiner's Statement of Reasons for Allowance
9.  Other \_\_\_\_\_.

*ALBERT DECADY*  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100

## **DETAILED ACTION**

This is a NOTICE OF ALLOWANCE in response to the instant U.S. Application 10/667160, filed 9/17/2003, which claims foreign priority of Korean Patent Application No. 2002-56314, filed on September 17, 2002. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d), with the certified copy filed in parent Application No. 10/667160.

### ***Allowable Subject Matter***

Claims 1-20 are allowed.

## **EXAMINER'S AMENDMENT**

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ryan C. Carter on January 27, 2006.

The application has been amended as follows:

The ABSTRACT of the disclosure has been replaced with the following amended abstract:

"An adaptive hybrid automatic repeat request system and method include transmitting a data frame having channel-coded data and a parity bit using an initial

coding rate, receiving the data frame and performing channel decoding and correcting any error that exists. When the error is not corrected, an error degree of a corresponding frame is measured and a NACK message to which the measured error degree is added is transmitted to the transmitting terminal. A parity frame is retransmitted by channel coding a parity bit corresponding to a parity level determined in accordance with the error degree added to the NACK message, and is combined with a data bit of a data frame in which error correction fails. Channel decoding and error correction are then performed."

CLAIMS 1-2, 6-7, 11-12, 15 and 17-18 have been amended as follows:

1. (Presently amended) An adaptive hybrid automatic repeat request method comprising:

(a) transmitting a data frame including a data bit and a parity bit that are channel-coded using a predetermined initial coding rate;

(b) receiving the data frame, performing channel decoding of the received data frame, and when an error exists in the channel-decoded data frame, correcting the error;

~~(c) when either there is no error in the channel-decoded data frame and when the error is corrected, transmitting an acknowledgement message to a transmitting terminal;~~

~~(d) (c)~~ when the error of the channel-decoded data frame is not corrected, measuring an error degree of a corresponding frame and transmitting a negative acknowledgement message to which the measured error degree is added, to the transmitting terminal;

{e} (d) transmitting a parity frame that is generated by performing channel coding of a parity bit corresponding to a parity level determined in accordance with the error degree added to the negative acknowledgement message; and

{f} (e) combining the retransmitted parity bit with a data bit of a data frame in which error correction fails and performing channel decoding and error correction.

2. (Presently amended) The method of claim 1, wherein in step {d} (c), when a low density parity check code is used for the channel coding, the error degree of the frame is measured using a value of posterior probability of each data bit of the decoded data frame.

3-5. (Original)

6. (Presently amended) The method of claim 1, wherein in step {e} (d), the parity level in accordance with the error degree is determined in consideration of a retransmission success probability and throughput.

7. (Presently amended) The method of claim 1, further comprising:

{g} (f) monitoring the error degree that is added to the negative acknowledgement message and transmitted to the transmitting terminal, for a predetermined amount of time and predicting a channel environment; and

{h} (g) adjusting the initial coding rate in consideration of the predicted channel environment.

8-10. (Original)

11. (Presently amended) A method of receiving data in an adaptive hybrid automatic repeat request system, the method comprising:

Art Unit: 2138

(a) receiving a data frame transmitted from a transmitting terminal, performing channel decoding of the received data frame, and when an error exists in the channel-decoded data frame, correcting the error;

~~(b) when either there is no error in the channel-decoded data frame and when the error is corrected, transmitting an acknowledgement message to the transmitting terminal;~~

~~(c)~~ (b) when the error of the channel-decoded data frame is not corrected, measuring an error degree of a corresponding frame and transmitting a negative acknowledgement message to which the measured error degree is added, to the transmitting terminal; and

~~(d)~~ (c) combining a parity bit that corresponds to the negative acknowledgement message and is retransmitted from the transmitting terminal, with a data bit of a data frame in which error correction fails and performing channel decoding and error correction.

12. (Presently amended) The method of claim 11, wherein in ~~(e)~~ (b), when a low density parity check code is used for the channel coding, the error degree of the frame is measured using a value of posterior probability of each data bit of the channel-decoded data frame.

13-14. (Original)

15. (Presently amended) A computer readable recording medium in which a program for executing an adaptive hybrid automatic repeat request method is recorded, the method comprising:

(a) transmitting a data frame including a data bit and a parity bit that are channel-coded using a predetermined initial coding rate;

(b) receiving the data frame, performing channel decoding of the received data frame, and when an error exists in the channel-decoded data frame, correcting the error;

Art Unit: 2138

(c) ~~when either there is no error in the channel-decoded data frame and when the error is corrected, transmitting an acknowledgement message to a transmitting terminal;~~

(d) (c) when the error of the channel-decoded data frame is not corrected, measuring an error degree of a corresponding frame and transmitting a negative acknowledgement message to which the measured error degree is added, to the transmitting terminal;

{e} (d) transmitting a parity frame that is generated by performing channel coding of a parity bit corresponding to a parity level determined in accordance with the error degree added to the negative acknowledgement message; and

{f} (e) combining the retransmitted parity bit with a data bit of a data frame in which error correction fails and performing channel decoding and error correction.

16. (Original)

17. (Presently amended) A computer readable recording medium in which a program for executing the method of receiving data in an adaptive hybrid automatic repeat request system is recorded, the method comprising:

(a) receiving a data frame transmitted from a transmitting terminal, performing channel decoding of the received data frame, and when an error exists in the channel-decoded data frame, correcting the error;

~~(b) when either there is no error in the channel-decoded data frame and when the error is corrected, transmitting an acknowledgement message to the transmitting terminal;~~

{e} (b) when the error of the channel-decoded data frame is not corrected, measuring an error degree of a corresponding frame and transmitting a negative acknowledgement message to which the measured error degree is added, to the transmitting terminal; and

{f} (c) combining a parity bit that corresponds to the negative acknowledgement message and is retransmitted from the transmitting terminal, with a data bit of a data

frame in which error correction fails and performing channel decoding and error correction.

18. (Presently amended) An adaptive hybrid automatic repeat request apparatus comprising of:

a transmitter for transmitting a data frame including a data bit and a parity bit that are channel-coded using a predetermined initial coding rate, and retransmitting a parity frame that is generated by performing channel coding of a parity bit corresponding to a parity level determined in accordance with an error degree added to a negative acknowledgement message transmitted via a predetermined channel; and

a receiver for receiving the data frame transmitted from the transmitter, performing channel decoding of the received data frame, ~~when there is no error in the channel-decoded data frame or the error is corrected, transmitting an acknowledgement message to the transmitter~~, when the error of the channel-decoded data frame is not corrected, measuring the error degree of a corresponding frame and transmitting a negative acknowledgement message to which the measured error degree is added, to the transmitter, combining a parity bit that corresponds to the negative acknowledgement message and is retransmitted from the transmitter, with a data bit of a data frame in which error correction fails and performing channel decoding and error correction.

19-20. (Original)

## REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

The prior arts of record taken alone or in combination fail to teach, anticipate, suggest or render obvious the claimed invention for an adaptive hybrid automatic repeat request method, as recited in the independent claims 1, 11, 15, 17, 18, including inter alia, "when the error of the channel-decoded data frame is not corrected, measuring an

***error degree of a corresponding frame and transmitting a negative acknowledgement message to which the measured error degree is added, to the transmitting terminal".***

Also, independent claims 8 and 16 recite an adaptive hybrid automatic repeat request method, including inter alia, "retransmitting a parity frame that is generated by performing channel coding of a parity bit corresponding to a ***parity level determined in accordance with an error degree added to a negative acknowledgement message transmitted from a receiving terminal".***

Subsequently, Claims 1-20 are allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

#### ***Pertinent Art***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kuo et al. (US20030145269) PUBL.: July 31, 2003, APPL-NO: 10/125644,  
FILED: April 19, 2002.

The closest prior art to the claimed invention is that Kuo discloses, Figures 1-4, a method of transmitting encoded symbols (X.sub.1, X.sub.2, X.sub.3, . . . X.sub.k (steps 101, 102, 103), including data and parity check (e.g., a cyclical redundancy check or CRC) for transmission 303, (Figures 1 and 2), and decoding (203) the

received encoded symbols according to accumulated log likelihood ratios (step 105), and at the error checker 204, performing error checks (e.g., a cyclical redundancy check or CRC) for a block of information bits (step 106). If the error check is passed, an acknowledgment (ACK) is sent from an ACK sender 206 (step 108). If the error check failed, a negative acknowledgment (NACK) is sent from a NACK sender 207 (step 109), and after the NACK is received at the source, the encoded symbols are retransmitted to the destination (step 110). A posteriori probability (APP) of the information b is calculated for the basis of the maximum a posteriori probability (MAP), which is an estimation of the most likely information bit to have been transmitted in a coded sequence of information.

However, Kuo fails to teach, anticipate, suggest or render obvious the claimed invention of "measuring an error degree of a corresponding frame and transmitting a negative acknowledgement message to which the measured error degree is added, to the transmitting terminal".

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES C. KERVEROS whose telephone number is (571) 272-3824. The examiner can normally be reached on 9:00 AM TO 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decayd can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2138

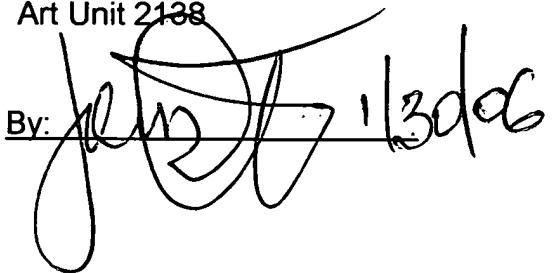
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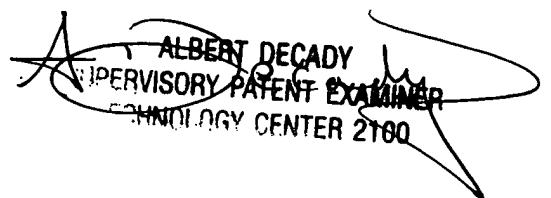
Date: 30 January 2006  
Office Action: Allowance

JAMES C KERVEROS  
Examiner  
Art Unit 2138

By:



A handwritten signature of James C. Kerveros, consisting of stylized loops and lines, followed by the number "1306".



A handwritten signature of Albert Decady, enclosed in a large oval. Inside the oval, the text reads: "ALBERT DECADY", "SUPERVISORY PATENT EXAMINER", and "TECHNOLOGY CENTER 2180".